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FEB 1 1922

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S. D.—63. [This leaflet is distributed only with the seeds to which it relates.]

DEPARTMENT OF AGRICULTURE

United States Department of Agriculture,

BUREAU OF PLANT INDUSTRY,

New and Rare Seed Distribution,

WASHINGTON, D. C.

ALFALFA.

Instructions adapted to the New England States and New York.

OBJECT OF THE DISTRIBUTION.—The distribution of new and rare seeds has for its object the dissemination of new and rare crops, improved strains of staple crops, and high-grade seed of crops new to sections where the data of the Department indicate such crops to be of considerable promise. Each package contains a sufficient quantity for a preliminary trial, and where it is at all practicable the recipient is urged to use the seed for the production of stocks for future plantings. It is believed that if this practice is followed consistently it will result in a material improvement in the crops of the country. Please make a full report on the inclosed blank regarding the results you obtain with the seed.

DESCRIPTION.

Alfalfa (*Medicago sativa*) is a deep-rooted, hardy, perennial forage plant belonging to the family which includes beans, peas, and clover. It occupies the same place in western agriculture that clover fills in the Northeastern States. In chemical composition it resembles the clovers, peas, and allied legumes in having a high protein content, but it slightly outranks any of these which are now in cultivation in percentage of both total and digestible protein. Good clover hay is almost equal to alfalfa in feeding value, but the number of crops alfalfa produces in one season makes the total yield per acre greater than that of clover. Since it is perennial, it will last a number of years from one sowing unless crowded out by weeds or otherwise destroyed.

SOIL REQUIREMENTS.

A deep, fertile, well-drained, non-acid soil reasonably free from weeds is required. It is practically useless to sow alfalfa on thin soils where the bedrock approaches the surface, on land underlain with hardpan, or in locations where the subsoil is so compact that the roots can not penetrate it to considerable depths. It is also equally useless to attempt to grow alfalfa on land where the fluctuating water table comes near the surface. For the purpose of ascertaining the character of the soil and subsoil and also the depth to the water table, numerous borings should be made with a soil auger. In determining the adaptability of a tract of land to alfalfa this instrument will generally be of greater assistance than a chemical analysis of the soil.

Not only should the land have good underdrainage, but the surface should have sufficient slope to carry off the surplus water readily. In fields that are too level, or in pockets, the formation of ice on the surface is fatal to alfalfa. In this climate ice may form on the surface even on considerable slopes, but this is a danger that can not be avoided and is least on these slopes. Rich river or creek bottom lands that are well drained are admirably suited to the crop. On such lands overflows may do no serious damage, provided they are not of long duration and come at a period of the year when the growth is practically dormant.

Limestone soils are in general especially well suited to the production of alfalfa, but even these soils are frequently acid and require liming before they will grow the crop successfully.

PRECEDING CROP.

When once started under favorable soil conditions, weeds, including bluegrass, are likely to prove the worst enemy. For this reason it is best to precede the alfalfa for one or two years with a clean cultivated crop, such as truck, potatoes, or corn. Summer fallowing also offers an excellent opportunity for eradicating weeds, but this practice is objected to on the ground that it results in the loss of the use of the land for a season. Successful stands are also secured following wheat, oats, and rye, provided the land has previously been treated in such a manner as to destroy the weeds. In this section, however, some difficulty is encountered in getting these crops off in time to permit the proper preparation of the land for sowing alfalfa the same season. Generally speaking, sowing on sod land is not recommended.

PREPARATION OF LAND.

The tender nature of the alfalfa plants requires that the soil be in excellent tilth at the time of planting. Many of the failures to secure a good stand may be traced directly to the improper condition of the seed bed. The soil should be fine and loose for the surface 2 or 3 inches, and below that it should be sufficiently firm to favor capillary action, yet porous enough to insure good drainage. Such a condition can best be secured by plowing the land the previous fall. In the spring, as soon as the weeds put in an appearance, the land should be disked to destroy them and further pulverize and settle the seed bed. From this time until the time of sowing, the land should be cultivated every 10 or 12 days, or at least with sufficient frequency to check the weed growth. If it is impracticable to plow in the fall, the land should be plowed at least six weeks before sowing and harrowed frequently, in order that the soil may be in the proper condition at sowing time. Land on which small grain has been grown may be prepared by double disking as soon as the grain is removed and then harrowing at frequent intervals until the seed is sown.

LIMING.

Practically all the soils in the region under consideration are benefited by applications of lime. The lime may be applied with a manure spreader, a fertilizer distributor, a lime distributor, or by hand. Any method which spreads the lime uniformly and at low cost is satisfactory. It should be applied at least two or three weeks before sowing, in order that it may become thoroughly incorporated with the soil. At least a ton of burned lime is generally required, and larger applications are frequently necessary. If ground limestone or ground oyster shell is to be used, the quantity should be double that of burned lime. Experiments have shown very little difference in the final results obtained from the different forms of lime. Burned lime will give quicker results, but the ground limestone and ground oyster shell will finally give the same benefit. The essential element in lime in any form is calcium oxid, and it is recommended that the farmer use whichever form of lime is cheapest, based upon the percentage of this element present. Where the consumer pays the freight, it should be remembered that he will not only have to pay such charges on practically twice as much of the ground limestone as of the burned lime but will also be to the additional expense of hauling and spreading 2 tons of the former to 1 of the latter in order to obtain the same results.

FERTILIZING.

Well-rotted stable manure which is at least comparatively free from weed seed is generally the most satisfactory fertilizer for alfalfa. Where the land is plowed in the fall it may be spread before plowing or it may be applied as a top-dressing during the early winter months. Beneficial results also follow heavy applications to the preceding crop.

Where stable manure is not available, a liberal application of commercial fertilizers, rich in phosphoric acid, should be made. The percentage of nitrogen may be low, but some nitrogen should be supplied for the young plants before they become inoculated and are able to secure their supply from the air. A combination which has given good results consists of 100 to 150 pounds of muriate of potash, 350 to 500 pounds of acid phosphate, and 50 to 75 pounds of nitrate of soda per acre. The cheapest and most satisfactory method for the consumer to obtain the desired combination is to purchase the various ingredients and mix them in the proper proportions.

INOCULATION.

Nitrogen-fixing bacteria should be provided unless the soil is known to be supplied with these organisms. Inoculation with them may best be accomplished by scattering over the area to be seeded soil from

a field upon which the crop has previously been grown successfully. The soil should be broadcasted at the rate of 250 to 500 pounds to the acre and harrowed in immediately. It is suggested that the spreading be done on a cloudy day or in the morning, as the sun's rays on the soil are thought to be destructive to the germs. Soil from the roots of sweet-clover plants also will inoculate alfalfa. In using soil as an agency to inoculate the land, care should be taken to avoid the introduction of noxious weeds and fungous diseases. The practice of sowing a small quantity of alfalfa with the regular sowing of clover each year for a few years before it is intended to devote the land to alfalfa has in some cases apparently resulted in satisfactory inoculation.

Another method which may be used is that of inoculating the seed with artificial culture, a limited quantity of which can be procured from the United States Department of Agriculture free of charge. Full instructions for use accompany each bottle of culture. The combined use of the soil and the artificial culture is recommended where both can be readily obtained.

SOWING.

The seed should be sown at the rate of 20 to 25 pounds to the acre, the heavier sowing being preferable, as it makes hay of a finer quality and helps to keep down the weeds. It may be drilled or sown broadcast with a wheelbarrow seeder and covered lightly with a smoothing harrow or weeder, care being taken to avoid covering deeper than 1 inch to 1½ inches. As a rule, a higher percentage of germination is secured from drilling, and such being the case the quantity of seed used per acre may be slightly decreased. A much more even stand can usually be secured by dividing the seed and sowing one-half each way of the field. The most successful stands of alfalfa are secured from sowing late in June or as soon thereafter as moisture conditions are favorable. It is seldom safe to sow much later than August 15, as the plants will not have sufficient time to become thoroughly established before winter sets in. Successful stands are occasionally secured from early spring sowings, although they are not generally recommended. A nurse crop should not be used unless the seed is sown in the spring, when 1½ bushels of oats or beardless barley, preferably the latter, may be used to help keep down the weeds. This should be cut for hay; otherwise, the growth of the alfalfa may be seriously checked. Successful stands have also been secured from sowing with early canning peas. In some cases the sowing of alfalfa in standing corn in the latter part of July has given successful results, but this method can be expected to succeed only when conditions are highly favorable.

TREATMENT OF THE STAND.

In spring sowings, unless the weeds threaten to choke out the young plants, the alfalfa should not be clipped until it is 12 to 15 inches high and commencing to bloom. The cutter bar should be set high, as the alfalfa is likely to be ruined if it is cut low. If the first cutting is light it may be left on the land as a mulch, but if heavy enough to smother the plants it should be removed. Late summer sowings should not be cut until the following season, and mowing should be discontinued early enough to allow a growth of 8 to 10 inches at the end of the summer to catch and hold the snow and protect the crowns of the plants.

If the alfalfa goes through the winter successfully, the first cutting usually may be made in June. It should be made when the plants are beginning to bloom, or, better still, when the basal shoots appear. In an average season three cuttings may be expected. If the plants turn yellow the alfalfa should be cut, no matter at what stage of development. If the stand becomes very thin or patchy, the field should be plowed and resown. Attempts at patching up poor stands have not generally been successful. If the weeds threaten to destroy the alfalfa a modified form of the spring-tooth harrow may be used with fair results. However, there is much doubt with regard to the value of cultivation for keeping down weeds or otherwise improving the broadcast stands. A top-dressing of well-rotted weed-free stable manure, applied in the late fall or early winter, preferably with a manure spreader, will not only furnish plant food but will also serve as a protection during the winter months. Where this is not available a light application of a commercial fertilizer consisting chiefly of acid phosphate with a small quantity of potash will tend to increase the growth and lengthen the life of the field. Under no circumstances should the field be pastured during the first two years, and even an old field should be pastured sparingly, if at all.

SOME COMMERCIAL VARIETIES OF ALFALFA.

Common alfalfa.—Under this designation is included the greater part of the alfalfa grown in the United States, the seed from the various sources frequently being designated by the State in which it was produced. Where alfalfa has been grown under a certain set of conditions for a considerable time, there is a tendency, through elimination, to produce a different type, presumably best adapted to the conditions under which it was developed. Thus, for instance, seed from fields that have been grown for several seed generations in Montana and the Dakotas may be somewhat more hardy than that grown farther south. Likewise, seed grown under semiarid conditions without irrigation may be superior for dry-land farming. In

sections where winterkilling is not a factor, the ordinary types are recommended in preference to the so-called hardy alfalfa, as they generally produce somewhat heavier yields.

Turkestan alfalfa.—Turkestan alfalfa was introduced into the United States from Turkestan in 1896, and during recent years practically all the seed imported into this country has been from that source. This variety, although quite variable, resembles common alfalfa in general characteristics, but as a rule does not produce quite as heavy yields. Selected strains have proved somewhat superior to the ordinary alfalfa both from the standpoint of hardiness and that of drought resistance. The variety as a whole, however, is generally inferior to the alfalfa commonly grown in this country, especially in the humid sections.

Grimm alfalfa.—Grimm alfalfa was introduced into this country in 1857 from Baden, Germany, by Wendelin Grimm, of Carver County, Minn. Careful investigations indicate that it owes its superior hardiness to the fact that it is the result of a natural cross between the common variety and the yellow-flowered alfalfa (*Medicago falcata*) and that by virtue of its being exposed to numerous severe winters the weaker plants were eliminated, leaving only the more hardy ones to perpetuate the strain. Grimm alfalfa does not differ materially in appearance from the ordinary strain, so that the casual observer has difficulty in distinguishing one from the other. While a large percentage of its flowers are of the same color as those of common alfalfa, there are some that represent many shades of violet, yellow, and other hues. The taproots show a tendency to branch, and the crowns are inclined to be low set and spreading, characteristics which undoubtedly are of great importance in rendering the variety resistant to drought. Grimm alfalfa is one of the hardiest, if not the most hardy, of our commercial strains. It is recommended for sections where the winters are especially severe and where little protection is given by snow. In sections where winterkilling is not an important consideration it is not thought to be materially superior to common alfalfa.

PUBLICATIONS AVAILABLE.

For further details regarding alfalfa, see Farmers' Bulletins 339, Alfalfa, and 757, Commercial Varieties of Alfalfa, which will be sent free of charge upon application to the Secretary of Agriculture, Washington, D. C.

Approved:

WM. A. TAYLOR,

Chief of Bureau.

SEPTEMBER 20, 1921.

